

# EXPLORING THE NEURAL CORRELATES OF E-ASSURANCE AND MULTI-FACED RISK IN E-COMMERCE

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Casado Aranda, Luis Alberto; Sánchez Fernández, Juan.

Universidad de Granada.

## RESUMEN

*El comercio electrónico ha permitido a multitud de pequeñas empresas exponer sus productos y aumentar su público objetivo potencial. Pese a la relativa facilidad de introducirse en este mercado, la mayor dificultad estriba en eliminar las barreras que limitan a los consumidores comprar online. Una de las vías que poseen mayor potencial para aumentar la confianza online y reducir el riesgo percibido es dotar a su web de señales de confianza, entre las que destacan los certificados externos, ratings de consumidores y políticas de privacidad. Este estudio precisamente usa una técnica neurocientífica (resonancia magnética funcional) junto a cuestionarios con el propósito de esclarecer objetivamente el procesamiento neurológico de esas tres señales de seguridad online. Además, usando estas nuevas herramientas, pretende dilucidar la debatida dimensionalidad del riesgo percibido. Los resultados aconsejarán a comercios online la señal más útil a incluir en sus webs y se concretarán las dimensiones del riesgo percibido.*

## Palabras Clave:

Comercio electrónico; señales de seguridad; riesgo percibido; resonancia magnética funcional; confianza.

## ABSTRACT

*E-commerce has allowed many small firms sell their products and broaden their target. Despite the relative ease in which vendors enter this marketplace, the strongest difficulty is to decrease barriers which discourage online purchases. One of the most useful ways to increase consumer online trust and reduce perceived risk is creating trust mechanisms in web sites, such as seals of approval, consumer ratings and privacy policies. Specifically, this study applies a neuroscientific tool (functional magnetic resonance imaging- fMRI-) together with questionnaires with the aim to clear up the neural processing of those trust signals (e-assurances). Furthermore, using fMRI, we explore the "under-debated" dimensionality of perceived risk. The findings will advise online retailers with the most useful e-assurance to include in their websites as well as will specify the dimensions of perceived risk.*

## Keywords:

E-Commerce; E-Assurance; perceived risk; fMRI; trust.

## 1. Objectives

### 1.1. *E-assurances*

The exponential increases in online shopping and the unprecedented rate of growth in the number of retailers selling online have created an extremely competitive market place. The relative ease in which vendors can enter this global marketplace has allowed an abundance of firms offering their products to consumers who are completely unfamiliar with them. These “unknown” vendors hope to build a reputation online and often seek ways of assuring the consumers that they are indeed legitimate and trustworthy. Vendors are obviously interested in the purchase intentions of potential customers and look for ways to reduce concerns that consumers may have about online transactions. The success of a company’s e-commerce depends on consumers who will purchase online but many of them experience important barriers when buying online (Wang, S., Beatty, S. E., & Foxx, 2004).

Previous literature has indeed examined which factors are the main deterrents in business to consumer commerce (B2C) and revealed that store trustworthiness, reputation, perceived risk and privacy can influence that willingness to purchase (Aljukhadar, M., Senecal, S., & Ouellette, 2010). Whilst reputation could be a great advantage for well-known firms, what measures might an unknown online business take? Several studies claim that unknown vendors may enhance their initial willingness to buy by using trust mechanisms on their web sites (Bahmanziari, T., Odom, M. D., & Ugrin, 2009; Karimov, F. P., Brengman, M., & Van Hove, 2011). Failing to use the initial trust measure properly, all other efforts of online retailers will be in vain since initial trust is expected to result in lower perceived risk and, consequently, in higher intentions and expectations to buy online.

There are many mechanisms available to vendors for the expressed purpose of building trust with consumers. Specifically, e-commerce studies have concluded that three types of trust mechanisms (namely, e-assurances) can be identified as ways of encouraging web trust in Internet transactions and therefore trust in e-commerce retailers: a) **Seals of approval**, assurance provided by a third-party vendor only after an independent evaluation of the online retailer’s e-commerce website and related activities. This type of e-Assurance means rigorous testing and includes a certificate from the third party (e.g. “Confianza On Line”); b) **Rating systems**, that give Web sites varying amounts of “stars” to indicate how the site rates based on previous customer feedback. This e-assurance constitutes an indication of vendor performance; and c) **Assurance statements**, which consist of a vendor statement including information about its returns, privacy and security policies. It does not include, therefore, an unbiased third-party evaluation of the online firm. (Pennington, R., Wilcox, H. D., & Grover, 2003). In summary, whereas each mechanism is designed to enhance trust in the site and reduce risk, they do so in different ways. Seals use independent verification through third parties, ratings use customer feedback, and assurance statements are the vendor’s self-reported statements about their policies and procedures.

Derived from those differences, e-commerce literature has evaluated the effects of such internal and external e-Assurance signals on initial trust formation in B2C e-commerce. For example, Pennington et al., (2003) concluded that only self-reported vendor statements (vs. seals of approval and rating systems) affect system trust and enable successful e-commerce outcomes. Similar findings were derived from Bahmanziari and colleagues’ study (2009),

which revealed that the presence of seals of approval did not affect consumers' trust or purchase intentions. Reversely, Nöteberg, Christiaanse and Wallage (2003) found that third-party assurance (vs. self-proclaimed assurance) significantly increased purchasing likelihood and reduced consumers' concerns about privacy and transaction integrity.

Instead of clearing up the inconsistent findings regarding the effects on trust of the three e-assurances, recent research has focused on analyzing the effects of different modalities of assurance statements, such as privacy disclosure (Liu et al., 2005), return policies (Wang et al., 2004) or ethical performance (Yang et al., 2009). Though the implications of such studies are undoubtedly remarkable, it is vital first to properly test the effects of seals of approval, rating systems and assurance statements on trust and risk by controlling several significant variables (e.g. consumer involvement, propensity to trust, risk propensity, level of experience of consumers). Otherwise, the conclusions of studies will lack of external validity (Karimov et al., 2011).

With this research gap in mind, our first purpose is to ascertain objectively and precisely the effects of three signals of assurance in e-commerce: seal of approval (through "Confianza-On-Line" seal), ratings of consumers (through "stars" from 1 to 5) and vendor statement (through security information). While there is great value in psychometric measurement tools that have dramatically advanced the study of trust through e-assurances, an interesting question is whether the use of functional neuroimaging tools (such as functional magnetic resonance imaging -fMRI-) could complement the psychometric measurement of the effects of e-assurances and offer additional findings. Taking these suggestions into account, our first goal is to explore the neural and self-reported responses to the three trust mechanisms (e-assurances) by controlling the perceived trust and risk of those e-assurances, the consumer involvement (through a book retailer), trust propensity, risk propensity and the experience in on-line purchases.

## ***1.2. Perceived risk***

Traditional studies in e-commerce have highlighted that trust mechanisms as e-assurances are expected to result in lower levels of perceived risk (Miyazaki and Fernandez 2000; Wang, S., Beatty, S. E., & Foxx, 2004), which is considered an antecedent of higher attitudes toward usage behavior, intentions to adopt e-commerce and willingness to buy in an online environment (Crespo, Á. H., del Bosque, I. R., & de los Salmones Sánchez, 2009). Given the importance of perceived risk in virtual environments, previous literature has explored its definition and dimensionality (Luo et al., 2010). Authors agree with considering perceived risk as a multidimensional construct that subdivides into several losses or risk factors, which together, explain the overall risk associated with the purchase/use of an online product or service.

Though it is well-established the multidimensionality of perceived risk, studies in e-commerce have used each different facets of perceived risk without consensus. For example, Pires, G., Stanton, J., & Eckford (2004) conclude that risk perceived represents an aggregated impact of six dimensions: financial (likelihood of suffering a financial lost due to hidden costs), performance (chances of the item failing to meet the performance requirements originally intended of the purchase), physical (probability of the purchase of resulting in physical harm), psychological (chances of the specific purchase being

inconsistent with the personal or self-image of the consumer), social (likelihood of the purchase resulting in others thinking of the consumer less favorably) and convenience risk (probability of the purchase resulting in lost time in terms of delivery, fitting or customization). In turn, Forsythe et al. (2006) only consider financial, product and time risk, and Chiu et al (2014) financial, performance, privacy (likelihood of that shopping on this website will cause me to lose control over the privacy of my personal and payment information) and product delivery risks. Trying to clarify the dimensionality of perceived risk, Chang, E.-C., & Tseng (2013) studied the relevance of risk dimensions along the time and concluded that financial and product performance risks are the most influential ones when consumers make online purchase decisions. Cunningham (1967) included these two risk facets together with the privacy risk in a higher-level category: performance one. Are these facets really different dimensions, or could they be included in a “higher level” performance category?

Since the dimensionality of perceived risk is still a debated issue in the literature, this study also aims to examine the neural correlates of the three key dimensions of perceived risk (financial risk, product performance risk and privacy risk) by using fMRI. This examination may help determine whether perceived risk is or not a multi-dimensional construct, and whether its respective dimensions share similar or distinct brain areas.

### ***1.3. Goals***

Therefore, this research project has a double objective: a) to explore the neural and self-reported responses to three trust mechanisms (seals of approval, ratings and vendor statements); and b) to shed light on the dimensionality of perceived risk by using fMRI.

## **2. Methodology**

### ***2.1. Participants and experimental design***

Forty heterosexual right-handed subjects (20 women and 20 men) averaging 29.90 (SD: 9.21), with no medical or technical problems are expected to participate in the study. All participants will have a similar experience in online purchase and we will control their trust and risk propensities, computer expertise and access to online payment methods.

We will use a hypothetical book store (“BOOKLER.com”) to eliminate any possible confounding effects from external variables, such as brand awareness or loyalty. Consumer involvement of participants in the online purchase of books will also be assessed. We will also control the willingness to trust and knowledge of the three e-assurances. Visual stimuli will be projected through fiber-optic goggles connected to a computer. First, one randomly selected (black and white) book will be presented for 3 seconds, which will serve to remind the subjects about each seller without having to read the individual text comments. This will be followed by a randomly selected e-assurance (controlled number of words and colors of images) presented for 8 seconds and a measurement item for a randomly selected risk dimension for the. Each item will be shown for 5 seconds without the scale. Then, a seven-point Likert-type scale will appear, and the subjects will select their choice by depressing one of the seven buttons using a fiber-optic mouse they will hold with their right hand. Subjects will have 3 seconds to make their choice. After clicking on their choice, they will be shown a new randomly selected e-assurance followed by a randomly selected item.

This procedure will be repeated for all e-assurances, measurements items and control items 9 times (total experiment: 38 minutes) -see Figure 1-.

FIGURE 1: **Experimental design.**



Fuente: Elaboración Propia

## 2.2. Behavioral study

Five minutes after the scan, the participants will take part in a behavioral task where they will evaluate their perceived risks and intentions to purchase (Karimov et al., 2011) online books when accompanied with three e-assurances. To carry this out, we will follow the same experimental paradigm. This behavioral study will be useful not only to overcome concerns that the setting and artificiality of the fMRI environment could bias the behavioral data, but also to link brain responses when watching e-assurances with intentions to purchase online books.

## 2.3. fMRI study

To explore brain activations during e-assurances and perceived risk measurements, we will use the fMRI tool, technique that provides indirect measurements of brain activation (Solnais et al., 2013). After image acquisition and pre-processing steps, we will model 6 conditions, 3 related to e-assurances: 1) seal of approval vs. vendor statements (and reverse), 2) vendor statement vs. ratings (and reverse), 3) seal of approval vs. ratings (and reverse); and 3 related to risk measurements: 1) one item related to financial risk vs. performance risk (and reverse); 2) financial risk vs. privacy risk (and reverse); and 3) performance risk and privacy risk (and reverse). After the modelling, we will run a whole-brain analysis to answer our brain objectives. Furthermore, a covariation analysis will be run to link brain activations to e-assurances with scores given to intentions to buy while participants watched those specific e-assurances.

## 3. Foreseeable Contributions

Addressing our two goals from consumer neuroscience perspective together with traditional measures will allow us: a) clear up neural processing of typical e-assurances in a low-involvement online environment. Whether several brain areas related to trust or confidence are more strongly activated to a specific trust mechanism (e.g. seal of approval), then we

will be able to advise (small or big) online retailers to include that e-assurance on their web sites; b) shed light on the dimensionality of perceived risk: whether different brain regions are more activated to privacy vs. financial vs. performance risk items, then that would mean that we process them differently and, consequently, they are different dimensions. In turn, if they activate the same brain regions, those dimensions may be included in a higher level category: performance one. Both theoretical and practitioners will benefit from the findings of this research project.

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